Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
High-Cost Universal Service Support	)	WC Docket No. 05-337
	)	
Federal-State Joint Board on Universal Service	)	CC Docket No. 96-45
	)	

DECLARATION OF ROBERT LOUBE IN SUPPORT OF THE COMMENTS ON FURTHER NOTICE OF PROPOSED RULEMAKING BY MAINE PUBLIC UTILITIES COMMISSION, MAINE OFFICE OF PUBLIC ADVOCATE, MONTANA PUBLIC SERVICE COMMISSION, AND VERMONT PUBLIC SERVICE BOARD

1. My name is Robert Loube. My business address is 10601 Cavalier Drive, Silver Spring, Maryland 20901. I am Vice President and one of the principal owners of Rolka Loube Saltzer Associates. My consulting practice centers on providing expert advice to state and federal agencies involved in telecommunications regulation. I have filed testimony using the FCC's Synthesis Model in three state proceedings.[1] With Dr. David Gabel, I prepared comments that compared numerous Synthesis Model results on behalf of the National Association of State Utility Consumer Advocates.[2] Prior to joining Rolka Loube Saltzer Associates, I worked for the Federal Communications Commission, the Public Service Commission for the District of Columbia, and the Indiana Utility Regulatory Commission. I was part of the FCC staff team that developed and implemented the use of the Synthesis Model. I worked on issues associated with

[1] Investigation Regarding Intrastate Access Charges and IntraLata Toll Rates of Rural Carriers, and the Pennsylvania Universal Service Fund, Pennsylvania Public Utility Commission Docket No. I-00040105; In the matter on the Commission's own motion, to review the total element long run incremental costs and the total service long run incremental costs for Verizon North Inc. and Contel of the South, Inc. d/b/a Verizon North Systems, to provide telecommunications services, Michigan Public Service Commission Case No. U-15210; Investigation on the Commission's Own Motion into Open Access and Network Architecture Development of Dominant Carrier Networks, Verizon UNE Phase, California Public Utilities Commission Investigation 93-04-002.

[2] In the Matter of Cost Review Proceeding for Residential and Single-Line Business Subscriber Line Charge Cap, FCC CC Docket No. 96-262.

the FCC's universal service mechanisms, incremental cost, rate design, competition and separations. My vita is attached to this affidavit.

The Impact of Line Loss on the Cost Model

2. The failure to re-run the model annually leads to insufficient support because of the relationship between cost and density. A decrease in lines causes wire center density to decrease due to the fact that the geographic area served does not change as the number of lines decreases. In any given wire center, a decrease in lines would increase the cost of serving the wire center because the impact of density on the cost of service is substantial. For example, the cost to build a trench remains the same whether a 100 pair cable is placed into the trench or a 200 pair cable is placed into the same trench. Under most conditions cost per customer would then increase as fewer customers are served.[3] In general, the cost per customer decreases as density increases in a smooth downward curve until becoming asymptotic to a positive value at high density values.[4] The practical impact of this curve is that the impact of line loss is less in high density wire centers than in low density wire centers. That is, a 5 percent line loss in a high density wire center might generate a 1 percent increase in cost while a 5 percent line loss in a low density wire center would generate cost of increase that is greater than 1 percent.

3. State average cost is the weighted average cost of all the wire centers within the state or study. As line counts decrease for all states, the impact of the line count decrease is disproportionate across the states. States with higher average cost will have a larger percentage

[3] Using Synthesis Model inputs, a 100 pair buried cable costs $1.65 per foot and a 200 pair cable costs $2.63 per foot. If the trench cost is $4.45 per foot, and the 100 pair cable serves 90 customers and 200 pair cable serves 180 customers, then the per-mile cost of serving 90 customers is $358 and the per-mile cost of serving 180 customers is $208.

[4] Mathematically the relationship between wire center cost and density is described by the function: cost = a + b/density.

of their lines in low density high cost wire centers. Those wire centers will incur a higher than average increase in cost as lines decrease. Thus, high cost states will incur a higher than average increase in cost relative to low cost states and the national average cost.

4. Therefore, the practical outcome of the FCC's failure to re-run the model on annual basis is to penalize high cost states. If the model had been run annually during a period of decreasing access lines, the gap between high cost states average costs and the national average cost would have increased. The difference between the high cost states average cost and a reasonable benchmark would have increased and the number of states above the benchmark may have also increased. Model support per-line is a function of the difference between the state average cost and the benchmark. Re-running the model annually would have increased that difference and thus, increased support per-line. By failing to re-run the model, the FCC ensures that the universal support model mechanism will not provide sufficient support to the carriers.

5. Moreover, each year that the FCC fails to re-run the model guarantees that the support will deviate further from the sufficient support levels. Support is determined by multiplying the support per-line by the number of lines. Support per-line is determined by the model. As noted above with decreasing lines, the support per-line should be increasing. The failure to re-run the model means that the support per-line remains at a constant level. Multiplying that constant by an ever decreasing line count means that support is ever decreasing and moving further away from the sufficient level of support.

Customer Locations

6. Accurate customer location data are essential to the estimate of wire center cost because the distance between the customer and the wire center determines the amount of outside plant investment required to provide service. That is, accurate customer location data is essential

for meeting the FCC's goal of estimating the least-cost network using the most advanced technology that is currently available. If the customers are not located properly then the model cannot accurately measure the amount of cable, the number of telephone poles, the length of trenches or the length conduit required to provide service.

7. The FCC recognized that need to use accurate customer location data. The FCC found in two separate orders that the best way to determine customer location is to use the geo-coded location of that customer.[5] Geo-coded customer location data means that for each customer the exact latitude and longitude of the customer location is an input into the model. When the FCC approved the Synthesis Model, however, techniques for determining geo-coded customer locations were not fully developed. Thus, the FCC approved a proxy method for determining customer locations. That proxy method started with 1990 Census Block data for the number of households in each census block. Using estimation techniques and the 1990 base data, a forecast of households by census block for 1997 was generated. Within each census block, customers were located based on a road surrogating method that distributed the customer uniformly along the roads within a census block.[6] The FCC recognized that this method was a stop-gap method and encouraged parties to continue to develop actual geo-coded data.[7] However, since November 2, 1999, the FCC has never changed the method or the data used to determine customer locations.

8. Since November 2, 1999, techniques for geo-coding customer locations have substantially improved. Companies, such as Infotools LTD, CMC International and DeLorme,

[5] In the Matter of Federal-State Joint Board on Universal Service, CC Docket No. 96-45, *Fifth Report and Order*, FCC 98-279, released October 28, 1998, (*Platform Order*) ¶33 :In the Matter of Federal-State Joint Board on Universal Service, CC Docket No. 96-45, *Tenth Report and Order*, FCC 99-304, released November 2, 1999, (*Inputs Order*) ¶¶ 34-37.

[6] *Inputs Order*, ¶ 43.

[7] *Id*., ¶ 39.

sell software that geo-codes addresses. Alternatively, these companies can geo-code a client's customer address list. In addition, there are a number of Internet web sites that allow users to geo-code customer addresses. Carriers have the capacity to geo-code customer address lists and have done so in support of their testimony and in response to data requests from other parties.[8] In three cases, I was able to use geo-coded data to run the FCC's Synthesis. In these cases, I obtained either the customer address list and geo-coded that list or I received the customer address list with geo-codes directly from the carrier. I put the geo-coded addresses into the FCC's Synthesis Model "IN" files and successfully ran the model. I defended the model results in my filed testimony.[9] Because it is now possible to geo-code customer locations and because the FCC has long recognized that the best way to determine customer location is to use geo-coded data, the FCC should require carriers to submit geo-coded customer location data along with the December 2009 customer line counts that carriers file with the FCC on July 31, 2010. These data files can be used to run the model in the fall of 2010 and that model run can be used to provide support in the first quarter of 2011.

Special Access Input Data

9. Special access lines connect two or more locations using dedicated circuits. The major users of special access circuits include (1) large corporations that purchase direct links to

[8] See the attached data request from AT&T to Verizon California filed in Investigation on the Commission's Own Motion into Open Access and Network Architecture Development of Dominant Carrier Networks, Verizon UNE Phase, California Public Utilities Commission Investigation 93-04-002.

[9] Direct testimony of Dr. Robert Loube on behalf of the Pennsylvania Office of Consumer Advocate in the Investigation Regarding Intrastate Access Charges and IntraLata Toll Rates of Rural Carriers, and the Pennsylvania Universal Service Fund,PA PUC Docket No. I-00040105; initial testimony of Dr. Robert Loube on behalf of TelNet Worldwide, Inc., ACD Telecom, Inc., TC3 Telecom, Inc., Michigan Access, Inc., JAS Networks, Inc., DayStarr, LLC, Clear Rate Communications, Inc., and Arialink Telecom. (the "CLECs"), In the matter on the Commission's own motion, to review the total element long run incremental costs and the total service long run incremental costs for Verizon North Inc. and Contel of the South, Inc. d/b/a Verizon North Systems, to provide telecommunications services, Michigan Public Service Commission Case No. U-15210; and declaration of Dr. Robert Loube on behalf of The Utility Reform Network in re: Investigation on the Commission's Own Motion into Open Access and Network Architecture Development of Dominant Carrier Networks, Verizon UNE Phase, Investigation 93-04-002.

long distance carriers, (2) wireless carriers that connect cell towers to wireless switches, and (3) Internet service providers (ISPs) that connect their access points to Internet backbone carriers. Special access lines do not receive universal service support. However, because special access lines are provided using the same telephone poles and cables as supported switched access lines, the Synthesis Model uses data related to special access to determine the average cost of providing service in each non-rural wire center.

10. The Synthesis model relies on ARMIS 43-08 report, a one time data request, and an algorithm that relates special access customer locations to business customer locations to determine the location of special access lines. The ARMIS 43-08 report determines the total number of special access for each non-rural carrier. The non-rural carrier special access line total is allocated to the wire centers of the carrier on the basis of the relative number of special access lines reported for that wire center in 1998 that were reported in the one time data request. Within the wire center, the algorithm places the special access lines at switched access line business locations.

11. There are three major problems with the FCC's method of determining special access line locations. First, most non-rural carriers are no longer required to file ARMIS reports. Thus, to obtain the total number of special access lines by carrier, the FCC must request the carriers to submit data that it has recently ruled was no longer necessary.[10] Second, the total number of special access lines has increased from 36 million voice grade equivalent lines in

---

[10] In the Matter of Petition of AT&T Inc. For Forbearance Under 47 U.S.C. § 160 From Enforcement of Certain of the Commission's Cost Assignment Rules, WC Docket No. 07-21, *Memorandum Opinion and Order*, FCC 08-120, released April 24, 2008; In the Matter of Service Quality, Customer Satisfaction, Infrastructure and Operating Data Gathering, WC Docket No. 08-190, *Memorandum Opinion and Order and Notice of Proposed Rulemaking*, FCC 08-203, released September 6, 2008; and In the Matter of Petition of Qwest Corporation for Forbearance from Enforcement of the Commission's ARMIS and 492A Reporting Requirements Pursuant to 47 U.S.C. § 160(c), WC Docket No. 07-204, *Memorandum Opinion and Order*, FCC 08-271, released December 12, 2008.

1998 to 303 million voice grade equivalent lines in 2007.[11] It is extremely difficult to believe that relative allocation of the 303 million voice grade equivalent lines among wire centers in 2007 is the same as the relative allocation of the 36 million voice grade equivalent lines in 1998. Thus, reliance on the one time data request appears to be arbitrary and capricious. Third, using an algorithm to determine special access line locations on the basis of switched access line business locations no longer appears to be reasonable because many special access lines serve wireless cell towers and bank automatic tower machines, locations where a switched access business line may not exist.

12. The proper solution to determine the locations of special access lines is to require the non-rural carriers to provide the geo-coded locations of the special access lines at the same time the carriers provide the geo-coded locations of the switched access lines. These data should be filed with December 2009 switched access lines on July 31, 2010. These data files can be used to run the model in the fall of 2010 and that model run can be used to provide support in the first quarter of 2011.

<u>Loop Design Algorithms – Minimum Spanning Trees</u>

13. Loop design algorithms determine how the model connects the customer locations to the networks. The Synthesis model employs such algorithms to design feeder and distribution plant. For feeder plant, the task is to connect the wire center to the serving area interfaces in each customer serving area. In distribution plant, the task is to connect each customer to the serving area interface. The serving area interface (SAI) is a junction box that connects feeder cables and distribution cables.

[11] ARMIS 43-08 Reports, Table III.

14. The loop design algorithm is based on a minimum distance spanning tree. The feeder spanning tree starts at the wire center and finds the nearest SAI that is not yet connected to the network and attaches to it. Then the algorithm connects the SAI that is closest to the first SAI. The algorithms proceeds in this manner until all the SAIs are connected. The algorithm is adjusted to allow the tree to start in four directions from the wire center, so that there can be four major branches to the tree (North, East, South and West). The distance between the nodes is measured using a rectilinear approach.[12] A similar method is used to connect customer locations to the SAI.

15. While this method minimizes distance and leads to the construction of a least-cost network, that network may not be reasonable because it is not constrained to use the right of ways or the road network. The Synthesis model constructed network may cross lakes and private property as it minimizes the distance traveled. Actual telephone networks are not allowed to follow those paths. In addition many roads curve and follow irregular patterns. Distances along such roads should not be measured using a rectilinear convention. Therefore, it is important to add the constraint that the minimum spanning tree must travel on the road network, and become a road constrained minimum spanning tree.[13] Road constrained minimum spanning trees have been available for some time and have been adopted by some state commission's for use in determining cost of service in Unbundled Network Element cases.[14] The FCC should be required to adjust its minimum spanning tree such that the spanning tree is constrained to follow the road network prior to re-running the model in the fall of 2010.

---

[12] C.A. Bush, D.M. Kennet, J. Prisbrey, W.W. Sharkey and V. Gupta, "Computer Modeling of the Local Telephone Network," October 1999. http://www.fcc.gov/wcb/tapd/hcpm/welcome.html.

[13] The roads must be limited to those roads that utility structures can be placed on.

[14] See for example, Direct testimony of James Stegeman on behalf of BellSouth, In the Matter of the Generic Proceeding to establish prices of interconnection services and unbundled network elements. Alabama Public Service Commission, Docket No. 27821, with the attached BellSouth Telecommunication's Loop Model (BSTLM) Methodology Manual.

I, Robert Loube, declare under penalty of perjury that the foregoing is true and correct.

Executed on January 27, 2010.

Robert Loube